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SKILLS

- ❖ Data analysis
- ❖ Image processing
- ❖ Radiative transfer
- ❖ Spectrophotometry
- ❖ Bayesian statistics
- ❖ Cooperation
- ❖ Outreach (all types of public)
- ❖ Project management

LANGUAGES



Fluent



Mother tongue



Intermediate (B2)

PROGRAMMING

Matlab, SPICE ★★★★★

Python, IDL ★★★★★

C, Java ★★★★★

EXPERIENCE

● Jun. 2023 –
Now

JPL Postdoctoral Researcher, Jet Propulsion Laboratory (JPL), Pasadena, CA, USA
Photometric study of Europa's photometry in preparation for Europa Clipper

- ❖ Data processing and analysis, image processing
- ❖ Telescopic observations
- ❖ Collaboration with ESA's JUICE mission to prepare for arrival at Jupiter

● Jul. 2020 –
May 2023

Internal Research Fellow, European Space Agency, ESAC, Madrid, Spain
Study of icy surfaces of the solar system through spectrophotometry.

- ❖ Data processing and analysis, image processing
 - ❖ *Photometric modelling of icy surfaces (Europa, Ganymede, Callisto and Enceladus).*
 - ❖ *Spectral variability of photometric parameters.*
 - ❖ *Multi-scale approach to photometry.*
 - ❖ *Metadata (pointing, position) correction, projections.*
 - ❖ *Simulation of future observations.*
- ❖ SOC (Science Operations Center) activities (~20%).
 - ❖ *Test of science planning tool under development for JUICE operations.*
- ❖ Co-study scientist for CDF (Concurrent Design Facility) studies.
 - ❖ *Scientific guidance for design studies of missions to the Jupiter and Saturn systems.*

● Feb.-May
2020

Postdoctoral researcher, Centre National de la Recherche Scientifique (CNRS), Orsay, Fr
Study of vibration ghosts in Mars Express' PFS (Planetary Fourier Spectrometer) spectra.

● Nov. 2016 –
Dec. 2019

PhD student, Université Paris Saclay, Orsay, France

Sup: Frédéric Schmidt (GEOPS) & Grégory Jonniaux (Airbus)

Photometric study of Jupiter's icy moons in preparation for ESA's JUICE mission.

- ❖ *Image processing, computer vision.*
- ❖ *Development of new tools.*
- ❖ *Modeling, data processing and interpretation.*
- ❖ *Provide input for validation of JUICE's navigation system.*

● Apr.-Sept.
2016

Research Intern, IRAP, Toulouse, France

Sup: Agnès Cousin

Study of physical matrix effects on LIBS (Laser Induced Breakdown Spectroscopy) spectra.

- ❖ *Data processing and analysis*
- ❖ *Laboratory experiments*
- ❖ *Application to Martian soil (ChemCam instrument)*

● Apr.-Sept.
2016

Student project, ISAE-SUPAERO, Toulouse, France

Sup: David Mimoun

Ground segment definition and operation scenarios for cubesat EntrySat.

- ❖ *Specifications*
- ❖ *Partial implementation*

- Jun.-Aug. 2015 **Research Intern**, University of New Mexico, Albuquerque, USA
Sup: Horton Newsom
Data processing and analysis of ChemCam (Mars Science Laboratory) spectral data.
❖ *Data processing and analysis* ❖ *Analysis of consequences of new calibration*
❖ *Assistance in science operations (choice of targets, etc.)*
- Jan.-Jun. 2015 **Engineering intern**, CNES, Toulouse, France
Sup: Charles Yana
Health assessment of ChemCam instrument (Mars Science Laboratory), operations support.
❖ *Development of an automated tool to support operations (regular health reports).*
❖ *Study of the instrument functions and link to housekeeping measurements,*
- Sept.-Dec. 2014 **Research Intern**, IRAP, Toulouse, France
Sup: Olivier Gasnault
Performance assessment (pointing and image quality) of the ChemCam instrument.

EDUCATION

- Nov. 2019 **PhD in planetary science**, Université Paris Saclay, Orsay, France
Study of the surface photometry of Jupiter's icy moons in collaboration with Airbus.
- Nov. 2016 **Master of Engineering**, ISAE-SUPAERO, Toulouse, France
❖ *1st year major: astrophysics, 2nd year options: nanosatellite design and operations.*
❖ *3rd year majors: Sciences of the universe & Conception and Operation of Space Systems.*
- Sept. 2016 **Master of Science in astrophysics**, Université Paul Sabatier, ISAE-SUPAERO, Toulouse
❖ *Major in planetary science*

COMMUNITY CONTRIBUTIONS

- Jan. 2023 - Now **Co-guest editor of Icarus' special issue "Ices in the solar system"**
- 2022 **Reviewer for « Geophysical Research Letters »**
- Jan. – Jun. 2022 **PSIDA (Planetary Science Informatics and Data Analytics) Conference 2022**
Member of local organising committee
- Dec. 2020 – May 2023 **ESA science faculty**
❖ **ESAC faculty council** – Exchequer & RF representative
❖ **Faculty supporting faculty initiative** – Launch and Coordination
❖ **Department of Science & Operations workshop 2021** – Member of LOC and SOC
- Jan. 2019 - Now **Europlanet Society**
❖ Chair of the Early Career network (EPEC)
❖ Early Career Officer for the French hub.
- Sep. 2018-19 **OSUPS – Observatoire des sciences de l'Université Paris Saclay**
Substitute representative for PhD students
- Nov. 2016-17 **Doctoral School SMeMAG (U. Paris Saclay) - PhD student representative**

TEACHING

- Aug. 2022 **Comité de Liaison entre Enseignants et Astronomes (CLEA), Gap, France**
Summer school for school / middle school teachers.
- 2018 - 2022 **ISAE-SUPAERO, Toulouse, France**
Occasional lecturer
- 2012 - 2018 **Private lessons for middle and high school students**
In Maths, Physics & Chemistry, English and Spanish

PROJECTS AND INTERNSHIPS MENTORING

- 2020 **European Space Agency (ESA), Madrid, Spain**
 - ❖ Jessica Hogan (undergraduate): *Spectrophotometry of Enceladus*
- 2017 - 2022 **ISAE-SUPAERO, Toulouse, France**
 - ❖ Co-supervision of 1st year projects (undergraduates), coordination with institutional actors (CNES, Cité de l'Espace, IRAP, CNRS)
 - SuperCam educational kits
 - Group 1: Henry Burguburu, Thomas Escaffre, Louis Kern, William Perrault
 - Group 2: Victor Colomb, Valentine Bourgeois, Flore Bray, Paul Ferrettini
 - Group 3: Julien Lafarge, Nicolas Kaikati, Axel Planchot, Nils Cahinght
 - Outreach project in middle school: activities, educational games, sky observations
 - Group: Romane Busato, Colas Chevalier, Florian Delpéch, Coline Van Leeuwen
 - ❖ Member of evaluation committee for the Diversity, Education and Civics (DEC) certificate
- 2020 **Université Paris Saclay, Orsay, France**
 - ❖ Alexandra Le Contellec (undergraduate): *Global photometry of Europa*.

SCIENCE AND COMMUNITY OUTREACH

JUICE : de la Guyane à Jupiter – Co-lead and initiator. *Ambitious itinerant outreach program in French Guiana around the launch of ESA's JUICE mission: conferences, activities for all public, sky observations, school visits & teacher training. More info: <https://www.cesti973.fr/agenda/juice-de-la-guyane-a-jupiter/>*

European Space Agency – [Bake the moon](#) recipe and campaign

ESA's JUICE mission – ESA spokesperson for the mission (2023). *Interviews with various medias*

Women (of color) in Science - Multiple conferences, round tables, interviews and school discussions

- ❖ L'Oréal Foundation – Ambassador (2016-2019)
- ❖ ISAEllles – 3rd year student representative (2015-2016), yearly interventions (2015-Now)
- ❖ Takeover of "[ResearchHers Code](#)" Twitter account (30 dec. – 6 dec. 2020)

Sens'Astro - Co-founder, Communication Officer & Executive Board (since May 2019)

Discovering space through the 5 senses and making it accessible to people with sensory disabilities.

OSE l'ISAE-SUPAERO - Contributor (since 2012) & Ambassador (since Jun. 2016)

Social outreach program aimed at encouraging access to higher studies and science to kids from rural and underserved areas. Tutoring, mentoring, outreach projects and development of educational content.

Entretiens de l'Excellence - Contributor (since 2012) & Chair of the "Aerospace" session

Yearly event where kids from underprivileged and rural areas can meet professionals from the same background in different fields.

UniverSciel - Contributor (2017-2020), Communication Officer & Executive Board (May 2017-Nov. 2018)

Outreach association based at IRAP (research institute in astrophysics and planetary science), Toulouse.

GRANTS & AWARDS

- 2018-2023 **Programme National de Planétologie (PNP) – CNRS, INSU**
 - 2021-2023, co-I: Joint contributions from modeling and spectrophotometry to study Europa's subsurface and cryovolcanic activity
 - 2018-2020, co-I: Study of Europa's surface and subsurface: contribution from modeling and photometry
- 2020 **U. S. Department of State**, International Visitor Leadership Program (IVLP)
- 2020 - 2023 **European Space Agency (ESA)**, Research Fellowship in Space Science
- 2018 **Zonta International**, Amelia Earhart Fellowship
- 2016 - 2019 **IDEX Paris-Saclay**, Initiative Doctorale Interdisciplinaire (IDI), Science and Innovation 3 year PhD funding from "excellence scholarship"
- 2016 **ISAE-SUPAERO alumni award**
- 2015 **Soroptimist autonomy and leadership award**
- 2015 **ISAE-SUPAERO Foundation excellence scholarship**

PUBLICATIONS AND COMMUNICATIONS

Peer-reviewed

G. Cruz Mermy, F. Schmidt, F. Andrieu, T. Cornet, **I. Belgacem** and N. Altobelli, Selection of chemical species for Europa's surface using Galileo/NIMS, *Icarus*, 2022, <https://doi.org/10.1016/j.icarus.2022.115379>

I. Belgacem, F. Schmidt, G. Jonniaux, Regional study of Ganymede's photometry, *Icarus*, 2021, <https://doi.org/10.1016/j.icarus.2021.114631>

A. Lagain, S. et al. (62 co-authors, including **I. Belgacem**), Mars Crater Database: A participative project for the classification of the morphological characteristics of large Martian craters, in Reimold, W.U., and Koeberl, C., eds., Large Meteorite Impacts and Planetary Evolution VI: Geological Society of America Special Paper 550, p. 1–16, [https://doi.org/10.1130/2021.2550\(29\)](https://doi.org/10.1130/2021.2550(29))

I. Belgacem, G. Jonniaux, F. Schmidt, Image processing for precise geometry determination, *Planetary and Space Science*, 2020, <https://doi.org/10.1016/j.pss.2020.105081>

I. Belgacem, [Photometry of Jupiter's icy moons](#), PhD Thesis, *Université Paris Saclay*, 2020,

I. Belgacem, F. Schmidt, G. Jonniaux, Regional study of Europa's photometry, *Icarus*, 2019, <https://doi.org/10.1016/j.icarus.2019.113525>

H. E. Newsom, K. S. Edgett, **I. Belgacem**, et al. (72 co-authors) A buried aeolian lag deposit and associated diagenesis at an erosional unconformity between the Murray and Stimson formations at Marias Pass in Gale Crater, Mars, *submitted to GSA Bulletin*.

S. M. Clegg, et al. (22 co-authors including **I. Belgacem**), Recalibration of the Mars Science Laboratory ChemCam instrument with an expanded geochemical database, *Spectrochimica Acta Part B: Atomic Spectroscopy*, 2017, <https://doi.org/10.1016/j.sab.2016.12.003>.

Invited seminars

- Feb. 2023 **Laboratoire de Géosciences et de Planétologie (LPG) – Nantes, France**
Comment la photométrie nous permet-elle de mieux comprendre la surface des lunes glacées de Jupiter ?
- Nov. 2022 **Oxford University – Oxford, UK**
Amospheric, Oceanic and Planetary Physics (AOPP) seminar series
Using photometry to better understand the icy surfaces of our solar system.
- May 2022 **Space Telescope Science Institute (STScI) – Baltimore, USA (remote)**
Exoplanets, Star and Planet Formation (ESPF) seminar series
Multi-scale photometry of Jupiter's icy moons
- Mar. 2022 **Institut de Recherche en Astrophysique et Planétologie (IRAP) – Toulouse, France**
Equipe PEPS (Planètes, Environnements et Plasmas Spatiaux)
Multi-scale photometry of Jupiter's icy moons
- Nov. 2022 **ESA – Noordwijk, Pays-Bas / Madrid, Espagne (remote), Heliophysics group**
Regional photometry of Europa
- Nov. 2022 **International Space Institute - Bern, Suisse (remote), ENCELADE 3.0 project**
Image processing for precise geometry determination

Published outreach articles

- ❖ La promesse d'habitabilité des lunes glacées du système solaire, Cahiers Clairaut #174, June 2021.
- ❖ All about space magazine #118, written answer for "Ask Space" section, June 2021
- ❖ Les mystérieux geysers d'Europe, lune glacée de Jupiter, Frédéric Schmidt and Ines Belgacem, The Conversation, <https://theconversation.com/les-mysterieux-geysers-deurope-lune-glacée-de-jupiter-127860>
- ❖ Make the wonders of space accessible to all, Ines Belgacem, Inspiring story for EPEC's outreach working group, Europlanet Society, <https://www.europlanet-society.org/inspiring-stories-make-the-wonders-of-space-accessible-to-all/>

Conference abstracts (selection)

- B. Seignovert, G. Tobie, N. Altobelli, **I. Belgacem**, M. Costa, C. Vallat and L. Penasa, The Planetary Coverage: a Python Library to Compute Planetary Opportunity and Coverage, *6th Planetary Data Workshop*, 2023.
- I. Belgacem**, T. Cornet, F. Schmidt, G. Cruz Mermy, F. Andrieu, Spectrophotometry of regions of Europa (poster), Ices in the solar system, 2023.
- T. Cornet, G. Cruz-Mermy, F. Andrieu, F. Schmidt, **I. Belgacem** and N. Altobelli, Revisiting the Jovian moons' surfaces in the infrared using the Galileo/NIMS database (poster), EuroPlanet Science Congress, 2022
- E. Luzzi, **I. Belgacem**, M. Mirino, and the EPEC committee, The Europlanet Early Career (EPEC) Network: Building a Community to Support Junior Researchers (poster), EuroPlanet Science Congress, 2022
- I. Belgacem**, T. Cornet, F. Schmidt, G. Cruz Mermy, F. Andrieu and N. Altobelli, Spectral variation of Europa's regional photometry (oral), EuroPlanet Science Congress, 2022
- F. Andrieu, F. Schmidt, G. Cruz Mermy, **I. Belgacem** and T. Cornet, Benchmarking methods to retrieve complex surface properties (poster), EuroPlanet Science Congress, 2022
- G. Cruz Mermy, F. Schmidt, F. Andrieu, **I. Belgacem**, T. Cornet and N. Altobelli, Microphysics of Europa's surface using Galileo/NIMS data (oral), EuroPlanet Science Congress, 2022
- B. Seignovert, G. Tobie, C. Vallat, N. Altobelli and **I. Belgacem**, The moon-coverage: a Python tool for mission and instrument planning (oral), EuroPlanet Science Congress, 2022
- G. Cruz Mermy, F. Schmidt, F. Andrieu, **I. Belgacem**, T. Cornet and N. Altobelli (poster), New insights into Europa's surface microphysics, Colloque quadri nial du Programme National de Plan tologie (PNP), 2022
- H. Massol, F. Schmidt, A. Davaille, E. Lesage, **I. Belgacem**, G. Cruz Mermy, F. Andrieu and C. Mergny, Apport conjoint de la mod lisation et de la spectro-photom trie dans l' tude du cryovolcanisme et de la subsurface d'Europe (poster), Colloque quadri nial du Programme National de Plan tologie (PNP), 2022
- B. Seignovert, G. Tobie, C. Vallat, N. Altobelli and **I. Belgacem**, The moon-coverage: a Python tool for mission and instrument planning (oral), PSIDA Meeting, 2022
- I. Belgacem**, T. Cornet, F. Schmidt, G. Cruz Mermy, F. Andrieu, N. Altobelli, Europa's Photometry Through the Spectrum - Revisiting Galileo NIMS data (poster), *Lunar and Planetary Science Conference*, 2021.
- I. Belgacem**, F. Schmidt, A. Le Contellec, G. Jonniaux, A Multi-Scale Look at Europa's Photometry (eLightning pres.), *AGU Fall Meeting*, 2021
- I. Belgacem**, F. Schmidt, A. Le Contellec, Photometry of Europa: estimation of albedo map and empirical global photometric model (oral pres.), *EuroPlanet Science Congress*, 2021
- B. Seignovert, N. Altobelli, **I. Belgacem**, R. Robidel, G. Tobie, C. Vallat, Planning science opportunities with the JUICE moon coverage tool, 5th Planetary Data Workshop and PSIDA Meeting, 2021
- I. Belgacem**, F. Schmidt, G. Jonniaux, Regional photometric study of Ganymede's surface (oral pres.), *Lunar and Planetary Science Conference*, 2021.
- I. Belgacem**, F. Schmidt, G. Jonniaux, Regional photometric study of Ganymede and Callisto (oral pres.), *European Planetary Science Congress*, 2020, <https://vimeo.com/457689819>
- I. Belgacem**, F. Schmidt, G. Jonniaux, Merging datasets for photometric study (oral pres.), *joint EPSC-DPS meeting*,
- I. Belgacem**, F. Schmidt, G. Jonniaux, Regional study of Europa's photometry (poster pres.). Joint EPSC-DPS meeting, 2019
- I. Belgacem**, G. Jonniaux, F. Schmidt. Image processing for remote sensing applications (oral pres.), *VESPA Mapping* 2019
- I. Belgacem**, F. Schmidt, G. Jonniaux, A new look at Europa's photometry in preparation of the JUICE mission (poster pres.), Lunar and Planetary Science Conference, 2019.
- I. Belgacem**, F. Schmidt, G. Jonniaux. Etude de la photom trie d'Europe (oral pres.), Colloque Quadri nial du Programme National de Plan tologie, 2018.
- I. Belgacem**, F. Schmidt, G. Jonniaux, Photometric study of Europa with Hapke model (oral pres.), *European Planetary Science Congress*, 2018.
- I. Belgacem**, F. Schmidt, G. Jonniaux. Estimation of Hapke parameters on selected areas of Europa using a Bayesian Approach (poster pres.), *Lunar and Planetary Science Conference*, 2018.
- I. Belgacem**, F. Schmidt, G. Jonniaux. Etude de la photom trie d'Europe (oral pres.), Atelier national "Traitement de donn es multimodales pour l'exploration et l'observation des plan tes" 2017
- I. Belgacem**, F. Schmidt, G. Jonniaux. Photom trie des satellites Galil ens (oral pres.), Atelier Image'In MULTIPLANETO 2016
- H. E. Newsom, **I. Belgacem**, et al. Chemistry of the materials above and below an unconformity between the Murray and the Stimson units in Gale Crater, Mars, *AGU Fall Meeting*, 2015.